

REMARKS

Reconsideration and the timely allowance of the pending claims, in view of the following remarks, are respectfully requested.

In the Office Action dated November 17, 2004, the Examiner rejected claims 1-12, under 35 U.S.C. §103(a), as allegedly being unpatentable over Pryor '696 (U.S. Patent No. 4,838,696) in view of Pryor '569 (U.S. Patent No. 4,753,569).

By this Amendment, Applicant has amended claims 1-12 to provide a clearer presentation of the claimed subject matter. Applicant submits that no new matter has been introduced. As such, claims 1-12 are presented for examination of which claims 1, 10, and 12 are independent.

Applicant respectfully traverses the prior art rejections, under 35 U.S.C. §103(a), for the following reasons:

I. Prior Art Rejections Under 35 U.S.C. §103(a)

In the Office Action, the Examiner asserted that Pryor '696 shows a sensor unit with an optical scanner mounted on a robot arm, a position measuring unit that determines the position of the sensor unit, and a computing unit that relates the optical scanner data with the position data. The Examiner acknowledged that Pryor '696 does not teach a camera-based sensor or a network of reference points and, therefore, relied on Pryor '569 as allegedly teach those features to render claim 1 unpatentable. Applicant respectfully disagrees.

Independent claim 1, as amended, sets forth a system for detecting the surface geometry of an object comprising, *inter alia*:

(a) a sensor unit . . . includes

(i) an optical scanner unit for non-touch probing and detection of the surface geometry of the object, and

(ii) *a position measuring unit including a camera-based sensor configured to register an image of a network including reference points in known positions and to determine the position of*

the sensor unit in a global coordinate system defined by said network of reference points . . .

(c) a computing unit configured to collect data from the optical scanner unit and the position measuring unit and to transform the data from the optical scanner unit to relate them to the global coordinate system.

As acknowledged by the Examiner, the Pryor '696 reference remains silent as to the use of a camera-based sensor to register an image of a network of reference points in known positions as well as the determination of the position of the sensor unit in a global coordinate system defined by the network of reference points, as required by claim 1. The Pryor '696 reference is directed to robotic apparatus that employs optical encoders and optical sensors to pulse light and “freeze” robot position determination data in time. The data is simultaneously read and fed to a computer which accurately computes the part location based on these input data. (*See, e.g., Pryor '696*: col. 1, lines 51-62). Pryor '696 further discloses that the simultaneous reading of the encoders and sensors compensates for various errors, such as drooping of the horizontal arm, unwanted deflections, *etc.* (*See, e.g., Pryor '696*: col. 3, lines 44-63).

There is, however, nothing in Pryor '696 that remotely suggests the use of a camera-based sensor to register an image of a network of reference points in known positions as well as the determination of the position of the sensor unit in a global coordinate system defined by the network of reference points, as required by claim 1. And, in contrast to the Examiner’s assertions, none of the references of record, including the Pryor '569 reference, cure the noted deficiencies of Pryor '696.

In particular, the Pryor '569 reference is directed to calibrating the robot's position as it approaches the work station, utilizing sensing means independent from the robot's own system for predetermining and guiding the robot's movements, and then sensing any deviation between a calibration signal and a reference signal. The deviation is then used to reset the robot's basic computer guidance system so that error signals in the robot’s program are reset, thereby in effect canceling out any errors which preceded the point of calibration. (*See, e.g., Pryor '569*: col. 1, line 61 – col. 2, line 7). Pryor '569 also discloses that, as the target 15 approaches the view of camera 21, the

computer 14 dictates that the arm 11 should be in a certain predetermined position and if a deviation is noted, camera 21 conveys this information back to the computer 14, in which computer 14 makes the corrections in the robot's memory for that position. The calibrating function is performed for a very limited area, *i.e.*, only in the area close to the work station as the operative end 12 approaches same, it is only correcting the robot position over a very small range. (*See, e.g., Pryor '569*: col. 3, lines 39 –50).

As such, the Pryor '569 reference does not provide a method for determining the position and orientation of the sensor unit, as required by claim 1, but merely teaches compensating for the deviation or errors at certain points inside the robot's working envelope.

Equally important is that fact that there is neither motivation nor suggestion to combine the teachings of the Pryor '696 and Pryor '569 references. That is, as discussed above, Pryor '696 is directed to capturing and “freezing” robot position data while Pryor '569 is directed to detecting deviations and correcting robot positions over a very small range. Artisans of ordinary skill would appreciate that combining the teachings of the Pryor '696 and Pryor '569 references makes no sense as the respective teachings are directed to different objectives.

Moreover, Pryor '696 discloses, in and of itself, a scanning solution that is not handicapped by the need to take data that is in close proximity to the calibration positions/orientation for accuracy, as does the Pryor '569 system in which data taken from other positions would have no better accuracy than the accuracy afforded by the robot system itself. Also, if Pryor '696 was looked to for improving the shortcomings of Pryor '569 in a scanning application, the skilled artisan would find little assistance as the compensation schemes presented in Pryor '696 are of little use where misalignment of the rotary axes is the main difficulty.

With this said, Applicant respectfully submits that concluding that it would have been obvious for the skilled artisan to apply the measurement arrangement of the Pryor '569 reference with the robot arm of the Pryor '696 reference is nothing more than the impermissible hindsight reconstruction of the claimed invention.

For at least these reasons, Applicant submits that none of the references of record, whether taken alone or in reasonable combination, teach the claimed combination of elements recited by amended claim 1. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claim 1 under 35 U.S.C. §103(a). In addition, because claims 2-9 depend from claim 1, claims 2-9 are patentable by virtue of dependency as well as for their additional recitations. Also, because independent method claims 10 and 12 employ similar features as claim 1, claims 10 and 12 are patentable for at least the reasons presented regarding claim 1. And, because claim 11 depends from claim 10, claim 11 is patentable by virtue of dependency as well as for its additional recitations.

II. Conclusion

All matters having been addressed and in view of the foregoing, Applicant respectfully requests the entry of this Amendment, the Examiner's reconsideration of this application, and the immediate allowance of pending claims 1-12.

Applicant's Counsel remains ready to assist the Examiner in any way to facilitate and expedite the prosecution of this matter.

Please charge any fees associated with the submission of this paper to Deposit Account No. 033975, Order No. 012199-0290591. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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